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2 CLAIMS

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4 1. Apparatus for securing a cylinder liner to a pumping
5 module, the apparatus comprising one or more
6 arrangements each fastened to said pumping module,
7 each arrangement comprising an assembly including a
8 piston, the piston acting on a tension plate, the
9 tension plate having a stud rod extending therefrom
10 out from the assembly at an end distal to the
11 pumping module and thereon passing through a
12 respective aperture in a clamping member adapted to
13 grip the cylinder liner, the rod having a first
14 portion substantially surrounded in an elastomeric
15 member and a second portion threaded to receive a
16 nut, wherein initial compression of the elastomeric
17 member by the tension plate and tightening of the
18 nut toward the pumping module, followed by release
19 of the elastomeric member forcibly compel the
20 cylinder liner towards the pumping module.

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22 2. Apparatus as claimed in Claim 1 wherein the
23 elastomeric member comprises a multi-layer structure
24 having layers of flexible material interleaved with
25 layers of strengthening material.

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27 3. Apparatus as claimed in Claim 2 wherein the flexible
28 material is a rubber.

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30 4. Apparatus as claimed in Claim 2 or Claim 3 wherein
31 the strengthening material includes a metal.

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1 5. Apparatus as claimed in Claim 2 or Claim 3 wherein
2 the strengthening material comprises a fabric
3 reinforcement.

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5 6. Apparatus as claimed in any preceding Claim wherein
6 the assembly comprises at least two parts, a first
7 part including the piston and a second part
8 including the tensioning plate, rod and elastomeric
9 member wherein the parts are separable for assembly
10 and disassembly.

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12 7. Apparatus as claimed in any preceding Claim wherein
13 the/each piston is a hydraulic piston.

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15 8. Apparatus as claimed in Claim 7 wherein the piston
16 and a base of the first part define a space for
17 accommodating hydraulic fluid.

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19 9. Apparatus as claimed in any preceding Claim wherein
20 there are four arrangements arranged equidistantly
21 around and externally of a circumference of the
22 cylinder liner.

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24 10. Apparatus as claimed in any one of Claims 1 to 8
25 wherein there are six arrangements arranged
26 equidistantly around and externally of a
27 circumference of the cylinder liner.

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29 11. Apparatus as claimed in any preceding Claim wherein
30 the clamping member comprises a clamping ring
31 including the apertures for receiving the stud rods.

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- 1 12. A method of securing a cylinder liner to a pumping
2 module of a pump, the method comprising the steps:
3 (a) locating a first part of an assembly including
4 a piston onto the pumping module;
5 (b) locating a second part of an assembly including
6 an elastomeric unit and a stud bolt having a
7 tension plate attached thereto, onto the first
8 part;
9 (c) locating the cylinder liner against a seal on
10 the pumping module;
11 (d) placing a clamping ring over the cylinder
12 liner;
13 (e) inserting the stud bolt through an aperture in
14 the clamping ring;
15 (f) placing a nut on a threaded portion of the stud
16 bolt and locating the nut against the clamping
17 ring;
18 (g) actuating the piston against the tension plate
19 to compress the elastomeric member and force
20 the stud bolt through the aperture;
21 (h) at full compression, tightening the nut against
22 the clamping ring; and
23 (i) releasing the piston and by the expansion of
24 the elastomeric member thereby sealing the
25 cylinder liner to the pumping module.
- 26
- 27 13. A method of securing a cylinder liner to a pumping
28 module of a pump as claimed in Claim 12 including
29 the step of pumping hydraulic fluid to the piston to
30 actuate the piston.